

Magnetic field line topology in MHD simulation of compared to IMAGE and POLAR imaging data for the Bastille Day event.

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Auroral images from the POLAR and IMAGE satellites give us snapshots of the ionospheric activity, updated regularly within 2-3 minutes. Selected wavelengths in visible and ultraviolet light provide the location of both ion and electron precipitation regions Auroral emission features are believed to be associated with closed magnetic field lines, even when disturbed by magnetospheric compression motions.

We use a BATSRUS MHD simulation of the July 14-16, 2000 (Bastille Day) event and trace magnetic field lines starting at the ionosphere in both hemispheres. Open field lines that end in the interplanetary field form the polar caps and are believed to be largely free of auroral emission features due to lack of particle precipitation. The field line tracings can show how accurately the MHD model reproduces the near-Earth magnetic topology as seen by the computed outline of the polar cap in the northern hemisphere with the satellite images. We find a very good match between the boundary of electron emissions and the computed polar cap boundary, but a discrepancy with the boundary of the ion precipitation. We interpret the difference between the computed polar cap boundary and the ion emission boundaries in terms of precipitation of ions accelerated in the compressed magnetosheath.

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